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B. W. KILGORE, DIRECTOR

RALEIGH

DUST-POISON METHOD FOR CONTROL OF BOLL WEEVIL

TRIBUTED IN FURTHERANCE OF THE ACTS OF CONGRESS OF MAY 8 AND JUNE 30, 1914

CONTENTS

introduction

Suggestions for 1923 (Place orders early)

Operations in 1922 (Discussion)

- Table of Results—comparative tests (with comment)
- Testimony of Farmers (comment)
- Chief Difficulties
  - Rains
  - The Night Work
  - Breakage and Wear of Machines
  - Regulating Amount Poison Per Acre
  - When to Begin to Dust

Machinery for Cotton Dusting (Types)

- Equipping with Dusting Machines

"How Many Acres Shall I Dust?"

Important Points to Observe—or Avoid

- Dusting Protects But Does Not "Make" a Crop
- Study Pays
- Follow Directions
- Precaution Against Possible Danger
- Don't Be Too Uneasy About Early Weevils
- How Arrange Nozzles for Dusting

How to Poison (The Specific Guiding Directions)

Tests by Virginia-Carolina Chemical Company
(Results of 237 tests in four states)

Final Remarks

ST-POISON METHOD FOR CONTROL OF BOLL WEEVIL

By Franklin Sherman, *Chief in Entomology*,
and
W. Bruce Mabee, *Assistant in Extension Entomology*

INTRODUCTION

The calcium-arsenate dust-poison method for control of the boll vil was developed mainly by the United States Bureau of Ento- ogy, chiefly by Mr. B. R. Coad and his associates at the Delta oratory, Tallulah, La. It is explained in Farmers Bulletin 1262 of ted States Department of Agriculture, Washington, D. C., copies of ch can be had from Washington or from county agents. It is also lained in Circular 124 of the North Carolina Agricultural Extension vice, Raleigh, N. C., copies of which may be had from county agents y application to Raleigh.

The present circular shows results secured from this method in thern counties of North Carolina in 1922, in tests directed by the rth Carolina Division of Entomology of the North Carolina State lege and Department of Agriculture, gives testimony of farmers, dis- ses the chief difficulties encountered, and is intended to make the ter so plain that any county agent or any studious farmer can ceed with even greater assurance than he could derive from the other publications already mentioned.

t meeting of Southern Agricultural Workers at Memphis, Tenn., in ruary, 1923, a committee of experienced men was appointed to sum- rize, condense and harmonize the facts of boll-weevil poisoning and trol problems.

This committee represented veteran experience with boll weevil, with icultural work, and with the importance of being accurate and safe. e following quotations from their report are important at this time his connection:

> Of the various methods of control involving the use of poison your com- tee recommends the calcium arsenate dusting method and the Florida hod. There are no other methods having as yet the sanction of adequate ntific proof. Whether the Florida Method will succeed elsewhere (than rida) cannot be determined until further studies ..... are made."
>
> As responsible agencies ..... the agricultural colleges can recommend to people only such methods as have been fully established by adequate and endable scientific data."

The report recommended test work by State and Federal agencies of er methods.

The dust-poison method kills boll weevils and thus protect squares and bolls, but it does not "make" cotton; hence it does no t the place of the Cultural Methods (advocated from the Divisi Agronomy) for securing an early setting of the largest possible Rather the dust-poison method should supplement (to be added tc Cultural Methods, the two together offering the best chance th now know to grow a profitable crop of cotton under heavy weevil tation. Also let us make it clear that in sections (or in fields, years) where there are few weevils and light injury, the dust-m will not give its highest returns, and that it *does* give its highest re where (or when) the weevil infestation is heaviest.

The dust-poison method appears sound, both in its principles a results. It has proven good in numerous comparative tests b United States Bureau of Entomology since 1916; by the experien experimenters in the several states south of us; by commercial f and by our own experience of 1922.

Despite objections to cost of machines and to the night work dust-method stands in our own experience as a profitable metho direct control of boll weevil, and it renders all the greater opport of a more certain profit when the Cultural Methods are fully empl It has been winning its way by definite and indisputably profi results.

It will pay the farmer to study the method as described in circular, so that he shall know what to do, when to do it, and how it. It is also important that he should not go astray in making was and needless applications of poison in fields where they are not ne or at times when they are not profitable.

The dust method is recommended more especially for fairly f lands; it is not advised to dust a crop which is naturally capable o than about one-third or one-half bale per acre; there should be reasonable assurance of a crop *worth dusting.*

With these suggestions plainly given, we commend the dust-p method to farmers who will do it carefully.

SUGGESTIONS FOR 1923

As the dust-poison method pays best under heavy weevil infesta we do not advise it in all that northern part of the North Car cotton area where injury is due to be light in 1923.

The region where we do advise it for 1923 is south of a line d from Hickory in Catawba County to Salisbury in Rowan, to (10 south of) Raleigh in Wake, to (about 8 miles north of) Washingt Beaufort. All the region south of such a line is due for severe inju 1923; and in the southern and eastern part of this region espec there is every reason to expect that proper dusting will pay well. all this region the Cultural Methods for early setting of crop shou studiously followed.

In the region north of the line indicated the injury will probably be
vier to southward and eastward, hence in such sections as Edge-
abe, northern Pitt, Martin and eastward there will likely be some
ds in which it would be profitable. A year hence (season of 1924)
entire cotton section up to the Virginia state line, will be due for
vy injury, closely approaching the full normal for future years. In
region north of the line the Cultural Methods for early setting of
p should be studiously followed as a preparation for the future, and
advise gathering and burning the squares (if practicable) once a
ek to middle or end of July.

Order Poison and Machines Early.—There is likely to be a shortage
calcium arsenate during 1923, so it is highly important that those
o intend to dust should place orders early for their poison, and the
ne advice applies (perhaps with less urgency) to machines. Both
sons and machines should be on the farms before June 1st, even though
ual dusting might not begin until the latter part of July. Calcium
enate should be bought at rate of 25 to 30 pounds for each acre which
is intended to dust. Likewise, machines should be ordered according
acreage, making sure not to attempt to dust too large an acreage for
machines you have. We wish to emphasize that care be used to
low the suggestions and directions.

A number of merchants in this state are handling approved machines
d calcium arsenate. Consult county agent, or write for information.

OPERATIONS IN 1922

Farmers are entitled to know the reasons for our confidence in the
per following of the dust-poison method.

In 1922 we undertook to advise and guide those who would use the
st-poison method in our southern counties where injury was due to
severe. Upward of 50 farmers did some dusting. We were in com-
unication with most of them and visited many of the fields. About
ty tons of calcium arsenate was used. At close of the 1922 season we
ve all the opportunity to describe their results, experiences and
inions. The replies of those who both dusted and reported are quoted
er—no unfavorable ones withheld—we give the entire showing. Some
l not report.

Mr. Mabee was located in Scotland County for most of the growing
ason, and personally followed the work on five farms to the point of
uring the comparative yield of dusted and undusted cotton (along-
le, on uniform land in same field) culture, fertilization, etc., being
e same. In Bladen, county agent R. K. Craven at Clarkton made a
nilar test on cotton of his own and has furnished us the figures. In
slow, county agent D. L. Latham has given us similar figures from
e work of Dr. L. D. Bryan at Snead's Ferry. These seven cases we
esent as fair comparative demonstration tests under field conditions.

The results of these tests, all figured on bases of one acre (though plots averaged larger than one acre) are shown in the following ta

DEMONSTRATION TESTS, BOLL WEEVIL CONTROL, 1922

Long Staple Cotton

Name and County	Times Dusted	Yield Seed Cotton per Acre, Pounds		Gain per Acre by Dusting		Cost of Dusting per Acre for Season	P A I
		Dusted	Not Dusted	Pounds Seed Cotton	Value		
Z. V. Pate, Scotland	6	1,883	1,481	402	$48.24	$ 7.00	$

Short Staple Cotton

1. J. N. Gibson, Scotland	4	1,311	1,054	257	24.93	2.88	
2. W. N. McKenzie, Scotland	5	1,612	1,464	148	14.22	4.75	
3. McL. Gibson, Scotland	5	1,845	1,468	377	36.53	4.13	
4. J. C. Hunsucker, Scotland	3	1,913	1,705	208	20.02	3.50	
5. R. K. Craven, County Agent, Bladen (own work)	6	1,000	500	500	48.42	10.92	
6. L. D. Bryan, Onslow (figures by County Agent Latham)	6	750	410	340	32.78	6.20	
Average for six short staple tests	5	1,405	1,100	305	$29.48	$ 5.40	$

Note.—The figures for times dusted, yield of dusted and undusted co gain by dusting, and cost of dusting, are figured from the records of farmers themselves with Mr. Mabee in all of the Scotland County tests the other two cases the figures are from county agent.

The figures on value of gain, and net profit per acre by dusting, are fig on following basis at suggestion of Mr. Frank Parker, Agricultural Statistic Long staple cotton at 32c. per lb. for lint; short staple at 25c. per lb. lint; also that one-third of weight of gain was lint, and two-thirds seed.

We have figured all seed at 2c. per pound, which we believe conservativ

The figures for cost of dusting includes labor and poison on 1922 prices, also includes an allowance for wear on machines except in case of Mr. Cra who in making liberal allowance for poison says that he thinks the cos given is sufficient without further allowance for machine, which he say yet in good condition.

Comment.—The highest gain in pounds of seed cotton is by Mr. Crave Bladen, who says that his figures, although "round," are very close to e accuracy; he was under heavy infestation and made heavy applications account of rains.

The lowest gain is by Mr. McKenzie, whose undusted plat was very nar and presumably received some poison while dusting adjoining rows, lessening the difference. In another test (separate from ours) his gain 368 lbs. seed cotton per acre. His average gain for the two tests was there 258 lbs. seed cotton per acre.

The highest net profit per acre by dusting is by Mr. Pate, whose cotton Delta Type long staple. His test is therefore not included in the *averag* bottom of table, which is for six short-staple tests only.

TESTIMONY OF OTHER FARMERS

e testimonials which follow are not so clearly convincing as the
s given in the preceding table, because of the lack of definite com-
ive figures. The season of 1922 was rainy, and we include letters
ow how some were discouraged by the rains, *while others were*
ng profitable gains by dusting during the same rainy season.

ANSON COUNTY

Bessie Little, Wadesboro:

One white tenant dusted about 7 acres with hand-duster, two acres
arated by road was dusted three times; says that dusted three times had
cotton while the other did not. It is his opinion that it paid."

V. C. Hall, manager for Eli Griggs, Wadesboro:

We think we got some results from dusting. While it rained continually
ing the dusting period, we picked 21 bales cotton from the 16 acres
ted." (This was in spite of heavy infestation in mid-July, as shown in
notes.—F. S.)

Lester Ratliff, Morven:

Don't know just what to say about it, as we had so much rain during
time we were trying to use the dust we didn't get a fair test of it. I
nk we must have gotten some good from it, but the fields we dusted had
many more weevils than the ones we didn't dust that it would be hard
tell."

. G. Atkinson, Wadesboro (place 25 miles out farmed by colored tenant):
ad about 16 acres in cotton and used mule-back duster (Saddle-gun) with
y good results. Could not leave fair undusted plat for comparison, but
l quite sure the operation paid. Dusted four or five times after and
ing big rains in first of August. Expect to use duster coming season if
evils show up as they did this year. I wish to thank," (etc.)

BLADEN COUNTY

. *Craven, County Agent:*

ee figures from his own cotton in table on page 6.)
'Mr. James Stevens, Council, N. C., with 50 acres Cleveland cotton esti-
ted that he made 400 lbs. more seed cotton per acre by dusting, five appli-
ions, 6 lbs. per acre each time. His brother did not do so well, as he
nted another variety cotton."

ONSLOW COUNTY

(name withheld), *Richlands:*

did not dust this year. It was too rainy for dusting to pay."

(name withheld), R. D. 1, *Jacksonville:*

'I didn't do any dusting. It is useless to dust when it rains every day."

e figures for Dr. L. D. Bryan, Onslow County, in table on page 6, to see
: dusting *did* during that rainy season.

RICHMOND COUNTY

Mr. W. H. Barton, County Agent, Rockingham:

"A marked difference can be seen in the top crop of fields dusted and not dusted. Those who dusted, so far as I can determine, did not undusted plats for comparison."

Mr. L. F. Thomas, Rockingham:

"Did not dust; only a few weevils in spots till about close of o season. Planted about 6 acres ordinary land and made 4 bales wi dusting. I think that did very well."

Mr. W. N. Everett (Everett Farms), Rockingham:

"We tried some of the various methods and the dusting method mended by the Department. While we kept no accurate account of picked from acres so treated, both our superintendent and the writer that the methods advocated by your department gave materially results than any other method used."

SCOTLAND COUNTY

(See figures in table on page 6 for results other than reported here.)

Mr. H. W. Malloy, Laurinburg:

"One acre not dusted, 700 lbs. seed cotton; one acre dusted, 724 lbs cotton.

"I might add that this land should not have been dusted, as its n production is only about 900 lbs. per acre.

"On the rest of the crop which was dusted I feel confident that the ing paid, and it is my intention to dust all my cotton in 1923 on land would normally produce as much as 1,200 lbs. seed cotton per acre. my figures are not more favorable, but I will continue to dust."

(If his dusting was well done, the small gain would indicate that his in tion was light.—F. S.)

H. W. McLaurin, Johns:

"I used the dust on my cotton this season, and am sure it paid well satisfied it increased my crop 15 per cent."

Mr. D. K. McRae, Laurinburg:

"I made enough on a few acres to pay for the machine and the ars On a field of 7 acres we made 7 bales, by four dustings. On 10 acres o staple cotton we made 8 bales.

"Where we did not dust we made about ½ bale per acre. It rai continuously," (etc.).

Mr. E. S. Gibson, Johns:

"Used dust on 13 acres. This made 12 bales. Another crop (not du of 12 acres made 8 bales; another of 22 acres made 14 bales; bu difference was not altogether due to dusting, for the land where d was done would make more than the other anyway."

Mr. G. G. Mathews, Laurel Hill:

"Made two applications of dust, and while I did not weigh in on the plat, I am satisfied that it paid me. Arranging to dust our entire a next year, and we have it understood with our tenants that they apply this poison. Thanking, . . . complimenting," (etc.).

UNION COUNTY

(name withheld), R. D. 1. *Monroe:*
"I did not dust. The boll weevil got my cotton. Made only 4 bales on 10
res, where I usually make 10 bales."

H. C. Boyce, R. D. 5, Monroe:
"I dusted a good deal and am well pleased with results, but did not have
y check (undusted) plats. On 1¼ acres dusted three times I got a bale
475 lbs. lint. Dusted as late as August 20. Expect to dust on larger
ale in 1923. Wish to thank," (etc.).

COMMENT ON TESTIMONY OF FARMERS

t will be noticed that while some report that they could not dust on
ount of rains, yet in the same counties others who *persisted* made good
lts by dusting. Also, the results in our table of comparative tests
page 6 show a substantial profit per acre in every case. It would
n that the season would have to be more rainy than 1922 to justify
glect of dusting. Indeed the general experience elsewhere has been
dusting is most needed, and often gives its highest profits in seasons
ch are classed as "rainy."

CHIEF DIFFICULTIES

t is fair that we should frankly recognize the chief difficulties which
encountered.

Rains.—Rains were frequent in season of 1922, yet the dusting paid
l. The treatments gave enough profit so that if one had to give two
even three) dustings in succession to get one that was fully effective,
re might still be a good profit.

Hence we suggest to take a chance on the weather and *dust even in
prospect of a rain* rather than neglect it after the dusting point is
ched. In this matter the grower has the chance to show judgment
skill, and can profit by being prepared to take advantage of every
nce. The official weather forecasts may help. While rains did
rfere, all our tests were profitable in spite of them. We aimed to
t *as the directions say* ("How to Poison," pages 20-21), and if a rain
ew us out of the schedule we returned to it at the earliest opportunity.

The Night Work.—We did not find this impossible or impracticable.
ny farmers (tobacco-growers especially) do night work at certain
sons. Small areas of cotton may be dusted in part of a night. Very
ge areas may call for all-night work for some men or shifts of part-
ht each.

t is well to arrange in advance to have a thoroughly competent work-
n do this work at the start (or do it one's self) and break in others
they learn by observation and by helping. Have at least one extra
tern.

In the hot weather of July and August night work is cooler than day
rk.

Breakage and Wear of Machines.—With the horse-machines th on this score was severe in hilly and stony fields, where broken lik cogs, wearing of gears, etc., were more or less frequent. We kn two in Anson County whose experience was flatly discouraging o account. In such fields we believe the tendency will be towa Hand-guns and Saddle-guns.

A certain amount of mechanical ingenuity is helpful in setting machine in first place and in keeping it in working order after The printed directions with a new machine should be noticed. parts most subject to wear should be quickly available. The g and operator should become familiar with the machine, test it ou watch its workings, before the time for actual dusting arrives. are plenty of farm machines (not to mention autos) which are complex and difficult than the cotton-dusting machines.

Regulating Amount of Poison Per Acre—Clogging of Pipes, I The general directions are to use "5 to 7 pounds per acre for each cation." While the machines have a device for regulating the fl dust, yet these are not always accurate, and it is advisable to m test on a few acres and correct it if needed. Farmers have the ten to use more poison than necessary; this may be on the side of s but it may easily run into needless expense.

A pipe may clog so that its flow of dust is not adequate; a kink, of trash in feeding device, or a "caking" of the dust by moisture at point. Experience soon helps to prevent or remedy these diffic Sheer accidents, such as running a machine into a stump or ditch, be costly. While the operation is yet new, it is best to entrust it or reliable workmen.

When to Begin to Dust.—The directions say: "Start poisoning the weevils have punctured from 10 to 15 per cent of the squa That time of 10 per cent puncturing (or more) we therefore cal "dusting point," and our experience indicates that it is abundantly w while for the farmer to know how to determine when this poi reached. And it is quite simple; here it is:

Examine 100 squares in each of 3 to 6 typical spots in the field (300 t squares in all). These spots should be well separated and representati the field in general. Open the shuck and examine the bud, doing this squares low on plants as well as in top, examining those large enough attractive to weevil (experience will soon teach). Do not pick unpunc squares, but ones showing the usual pimple-like "puncture" should be p and put in pocket. Having thus examined 100 squares on one or two ro the first spot, you now count the punctured squares in pocket. If there 15, write down on your piece of paper "15" for the first spot. Go to the spot and make similar count and examination; perhaps here you will find and write it down. The third spot may show "9," and the fourth may "11." You then merely average the four counts: 15+27+9+11=62 (d by 4 to get average)=15½ per cent for the four spots, and as this is ov per cent, dusting should at once begin.

It is entirely simple, and any person who has the least aptitude for uring can become proficient in an hour of *actually doing it*. Four to t spots in a field of 5 to 10 acres can be adequately examined, and lculation made, in one-half to one hour by one person. If a certain le or end of field is found to be regularly much more heavily infested rlier in season than the rest of the field, that *portion* may be given an rlier dusting. If the infestation seems reasonably uniform (or with any bad spots) over the whole field, then dust the whole when the neral average reaches 10 per cent. But the examination should be *ir*, including squares low on plants as well as high, as otherwise one ay merely deceive one's self.

There is much sentiment for poisoning the first weevils, killing them *fore* the 10 per cent point is reached, etc. Our experience indicates at this may be misleading and is apt to result in waste. To wait until) per cent of the squares are punctured *does not* mean that 10 per cent the crop is destroyed, for there is normally a surplus of squares. In)22 there were many fields in our southern counties which had weevils om the time they came out of winter-hiding (late May), yet which id not reach the "dusting point" (of 10 per cent of squares being unctured) until a good crop was well assured; such fields, not dusted all, often yielded as much as in former years; to have dusted them rly apparently would have been wasteful. But there were other fields which the "dusting point" (of 10 per cent) was reached by middle or nd of July; in such fields those that were well dusted made a full (or early) normal crop, and those which were not dusted made much less han a normal crop. Our experience, with many examinations and ounts recorded in our notes, indicated over and over again that hunreds of dollars could easily be wasted by needless dusting, and hunreds of dollars gained by dusting when it was needed.

In 1922 in our southern counties the "dusting point" (of 10 per cent) as reached in heavily infested fields from July 12 to August 1, and *veraged* about July 25, approximately two months after weevils first ppeared in the fields. For two months, with weevils in the fields, we at tight and *saved,* as one farmer figuratively remarked: "waiting until e could see the whites of the enemies' eyes before firing." Then, when he "dusting point" (of 10 per cent) *was* reached, in late July, we *began* he dusting, and our results were profitable in *every case,* as shown in able on page 6.

If the dusting practice becomes permanently common among our eople, undoubtedly this point of when to begin dusting will become nore or less fixed by community practice, the more careful farmers etting the pace, and the time to begin may vary from year to year ccording to severity of infestation. Our effort in 1922 was and our ffort in writing these pages is, to point the way safely for the more

careful farmers. Dusting need not begin on any fixed date; it dep on the weevil infestation, not on the calendar. Gradually *approxi* calendar dates may come into use.

We readily grant that as the "dusting point" approaches, it is be to begin dusting a little before it is actually reached than to delay long.

MACHINERY FOR COTTON DUSTING

There are four general types of cotton dusting machines, adapte different acreages or conditions. Between makes of machines of same type there is room for difference of opinion. A number of r chants in the State are handling machines. Consult county agent farmers who have had good experience, or write us for information.

Fig. 1.—Hand gun in operation in cotton field.—(*From U. S. Dept. Agr.*)

Hand-gun.—Carried by operator, worked by hand, treats one row time. One machine can take care of 5 to 8 acres of cotton for season. Better not attempt these on more than 20 to 25 acres. La one to three years according to care and use. Costs from $12 to $ (See Fig. 1.)

The Hand-guns are in favor for small acreages, odd patches, sh rows, etc., for those of limited means, or for getting preliminary perience first season. One or more may well be used on larger planti to supplement the larger machines.

FIG. 2.—Saddle gun in operation in cotton field.—(*From U. S. Dept. Agr.*)

Saddle-gun.—This is a type of duster which is carried on mule-l and operated by rider, treating two rows at time (one each side). machine can take care of about 50 acres of cotton for the season, should last 1 to 3 years. Costs around $50 or more according to att ments. This type is quite in favor for rough, stumpy, irregular l with short rows, etc. (See Fig. 2.)

The Saddle-guns seem to be winning their way rapidly, especi for rough, hilly, or wet lands, irregular rows, etc.

One-mule Machine.—Operated by one man and one mule; runs tween rows like walking-cultivator on single wheel, which is geare fan. Treats two rows at time (one each side). One machine can t care of 50 to 60 acres of cotton for the season, and should last 3 years. Costs around $100 to $125. (See Fig. 3.)

There are many who favor the One-mule Machines because of t adaptability for rapid work, the fan being driven by the wheel inst of by hand. We expect them to gain in favor more especially in smoother, more level lands of our eastern counties.

Cart Machine.—Two-wheeled machine, straddles one row, oper by one man (who rides) and drawn by two mules. Treats 3 row time. One machine can take care of about 100 acres of cotton for season, and should last 4 to 6 years. Wheels geared to fan. C around $250 or more. (See Fig. 4.)

As yet but few of these larger machines have been used in this St Naturally they are for larger acreages, and better suited to level fie as in our eastern counties. From what we hear they have given sa faction.

Equipping with Dusting Machines.—We do not care to here exp any preference for particular machines—your own opinion after e rience might be different from ours—but we may help you to decide the *type* of machines to use. Let us "suppose" several classes of farm

(1) Growing 5 acres cotton on one farm.—One Hand-gun should enough for a case of this kind.

(2) Growing 10 acres cotton on one farm.—Two Hand-guns, which w be cheaper, or one Saddle-gun, which could handle the work rapidly and with greater certainty.

(3) Growing 20 acres cotton, one farm.—Four, or better five, Ha guns might do, but it would be better to have one Saddle-gun one One-mule Machine. Might be well to have one Hand- (extra) for short rows, odd corners, etc.

(4) Growing 50 acres cotton, one farm.—Either, one Saddle-gun, preferably one One-mule Machine. We would advise one Hand- in addition.

(5) Growing 75 acres cotton, one farm.—Two Saddle-guns, or two mule Machines (one might do), or one of each type. A Hand- also would be handy.

(6) Growing about 100 acres, one farm.—Either one Cart-machine two Saddle-guns or two One-mule Machines, or one Saddle-

FIG. 3.—One-mule machine in operation, not in growing cotton to better show the machine. (From U. S. Dept. Agr.)

and one One-mule Machine, with also a Hand-gun for odd pla etc. We would incline toward two less expensive machines rat than one more expensive one—your preference may lead to other decision.

(7) Cotton on several farms.—For a case of this kind we believe it bet to equip for each, separately—for there is delay and wear in hal ing a machine from farm to farm—one might get good benefit a the other not, or even both might fail of proper benefit. If seve farms with small acreage each are close together, one of the lar capacity machines may do for several—but be careful.

We incline to advise one to go conservatively in his first attempts dusting, furnishing *ample* machinery for the one or more fields wh are to be dusted, even if other fields are left undusted in the first yea experience. Certainly it is not safe to go beyond the capacity of machine—thus we have given the capacity of the One-mule type as to 60 acres for season; if one were to attempt to dust 75 to 100 ac with one One-mule Machine, he almost certainly could not get over t whole at the frequent intervals (4 days, preferably) that is desirable the height of the dusting season, and would perhaps fail of proper res on the whole 100 acres; whereas, if he limited it to its proper capac of 50 to 60 acres, his result might be highly profitable.

We have mentioned Hand-guns to supplement the larger machines f larger acreages. They are handy for corners, odd rows, stumpy plac or in an emergency when the larger machine might be out of order. B the hand-operated machines are more tiring on the operator and l regular in their delivery of dust (when operator is tired) than t wheel-geared machines. The wheel-geared machines are less expensi in operation (especially on the item of labor cost), though they a more expensive in purchase-price; and in our experience broken lin etc., are often frequent.

While we cannot discuss every condition of farms and acreage, have tried to go far enough into this detail to show that one should co sider carefully how much acreage he will attempt to dust, should ord ample machinery for that acreage, and then *not* attempt greater acrea than the machinery can handle.

And a good general guiding rule is: *have enough machinery to g over the acreage in three full night's work.* This is the general basis which we have stated the acreage capacity of the machines: thus, indicating the capacity of One-mule Machine at 50 to 60 acres, we me that the machine should dust that acreage in 3 full nights operatio (i. e., from 14 to 20 acres per night). Allowing one night for rain delays, this gets over the entire acreage at four-day intervals.

Of course the acreage covered will depend on the skill and indust of operator, and the rate-of-step of mule, etc. And the number of yea that a machine will last will depend on care and use.

Fig. 4.—Cart machine in operation in cotton field; with acetylene light.—*From U. S. Dept. Agr.*)

CALCIUM ARSENATE (The Poison)

As this is written, there is prospect of a shortage of this in 1923, a
we hope that it will be relieved before 1924. Under a similar but l
acute shortage in 1922 our growers who ordered *early* (March to Ma
secured what they ordered. This year (1923) we are urging early ord
ing, and we are informed of many tons (even carloads) already in t
State. Whether one wishes to order independently or in coöperati
with others, our advice is *to place the order* without delay. A number
merchants in the State are handling this material. Consult coun
agent, or write for information. Present prices range from 17 to
cents per pound, according to quantity, etc.

How Much to Order.—We advise ordering 25 to 30 pounds of calciu
arsenate for each acre it is intended to dust—the smaller amount w
cost less, but the larger amount is safer as allowing for some waste
rains, etc. Thirty pounds would permit of five dustings of 6 lbs. p
acre each. Experience indicates that generally the number of dustin
needed varies from 3 to 6—with occasional cases where more than s
may be needed, or where less than three may do. If one has poison le
over it may be sold, or it is good for another year if kept perfectly dr
The man who must economize to the limit and who may lack confiden
in the method, may order a minimum—but he who is proceeding wit
safe and studious confidence will see the wisdom of having plenty f
his needs and then using it at the time when it gives best profit,
proper rate, at proper intervals.

"HOW MANY ACRES SHALL I DUST?"

This must depend on your ability and willingness to provide adequat
machines and poison—and the ability of your labor organization t
handle the work. Those with small acreage and fair means may unde
take to dust all their cotton. Those with large acreage, scattered farm
indifferent labor, or limited means, may well prepare to have only on
or a few, of their fields dusted, these to be selected among those worker
who are most competent, or whose fields are most infested—and expan
their operations in years to follow as experience points the way.

While yet lacking in actual experience, one may well give muc
thought to having his first dusting *properly* done ("Do It Right or No
at All"), for all the great body of experience—not only our own, but i
other states also—indicates that success lies in having such a plan ade
quately provided for.

IMPORTANT POINTS TO OBSERVE—OR AVOID

**1. Dusting Protects, but does not "make" a Crop.—Do not imagine tha
mere "dusting" will make a profitable crop of cotton in spite of bol
weevil—it will not. The very best of Cultural Methods for securin
the largest possible "setting" of the earliest possible crop are highl
important. In the fields where our comparative tests were conducte**

in 1922 (see table, p. 6) the Cultural Methods were generally good, so that even the undusted cotton gave fair yields; and then, when we applied the dust-poison method, substantial additional profits were secured by the dusting. A late, poor, stunted crop on thin, poor land, carelessly cultivated, might be a losing proposition anyway, and dusting (even if well done) on such a crop might not pay. There should be the reasonable assurance of a crop worth dusting. It is not advised to dust a crop naturally capable of less than about one-third or one-half bale per acre. And of course, by good cultural methods many profitable crops are raised without dusting.

Study Pays.—We know of no substitute for intelligent care and proper study in meeting the boll weevil problem. As in any other test, some have failed in this test, and others have "kept on their feet."

Follow Directions.—Give careful heed to the brief explicit directions under "How to Poison," on pages 20-21. These directions are simple, clear and definite; in our experience thus far success lies in following them.

Precaution Against Possible Danger.—Although about 50 tons of poison was dusted on cotton in North Carolina in 1922, we have not heard of any case of death or sickness (even of farm animals) which was laid to this dust-poison method.

Yet it should be remembered that calcium arsenate (an innocent-looking white powder) is poisonous. The containers should be kept closed, so the material will not be reached by children or animals. In using the horse-drawn machines put a muzzle on animal, especially if inclined to nip at plants; however, in all except the hand-guns, the poison is delivered behind or below both animal and operator so the animal is usually between unpoisoned rows. The operator should breathe as little of the dust as possible. After dusting work the horse may be cleaned or curried; and operator should wash, clean finger nails, brush off clothes and (if possible) change garments. With these cautions we have heard of no accidents.

With the several weeks that elapse after last dusting and before picking, the poison disappears to such extent that after picking the cotton may be grazed.

Don't be too Uneasy About the Early Weevils.—An anxious grower may easily waste time, poison, and wear of machines in wasteful dustings for early weevils. It is advised to "start poisoning when weevils have punctured 10 to 15 per cent of the squares." Our experience was that this time arrived (approximately) after middle of July. This threw the main dusting operation into a short season (4 to 6 weeks) when the crop needed the protection most.

In case weevils seem to be so abundant before squares begin to form as to puncture a destructive percentage as fast as the squares are well formed, it would then be advisable to make the first application when the cotton starts squaring freely, or about the time the plants average from 4 to 5 squares each. While this necessity apparently arose under the heavy spring emergence of 1922 in some of the states south of us, we did not observe it in North Carolina in the same year.

The "Florida Method" includes a distinct and separate procedure aimed at the early weevils—but its adaptation to this State is not yet worked out.

There was a period of two weeks or more (late June to early J
1922) when weevils were scarce—this was a natural interval betwe
the over-wintered generation which had died off and the newly h
next generation. This deceived many who thought they already
the weevil under control. The same natural interval occurred wh
no effort was made against the early weevils.

Our profitable result in every case, by waiting until the 10 e
cent point was reached, justifies us in advising not to break hast
away from the definite directions. Better to cling to what has pro
good until clear tests or contrary experience shall point the way t
still more profitable proceedings.

6. How Arrange Nozzles for Delivery of Poison? The Hand Guns e
liver the dust obliquely downward, and with them we prefer to hl
the nozzle from 6 inches to one foot above or from the plants. Th
Saddle Guns deliver chiefly downward, and we suggest to have t
nozzle about a foot above average height of plants. The lar
(wheel-geared) machines deliver downward or horizontal, and w
prefer the horizontal delivery to be about 6 inches above aver
height of plants.

All these details are subject to variation. The essential objec
to deliver a uniform cloud which (in the still air with the pla
moist) will slowly settle. Our examinations after dusting sho
the dust inside (under the bracts) of the squares. It is not desi
to have certain leaves or plants receive much heavier coating of d
than others, hence the advantage of not having the nozzles conti
ally dragging on the wet leaves of the plants.

HOW TO POISON (The Specific Guiding Directions)

(Adapted from U. S. Dept. Agr. Circular 162, by Coad and Cassidy.)

1. Use only pure calcium arsenate in form of dry powder.
2. Apply this only in the dust form.
3. Use only dusting machinery especially constructed for cotton-dusti
4. Dust only when the air is calm and the plants are moist. This pr
tically means making only night applications.
5. Use about 5 to 7 pounds of calcium arsenate per acre for each appli
tion.
6. Start poisoning when the weevils have punctured from 10 to 15 p
cent of the squares.
7. Keep the cotton thoroughly dusted until the weevils are under c
trol. This usually means about three applications at rate of o
every fourth night.
8. Then stop dusting (poisoning) until the weevils again beco
abundant.
9. If the weevil again becomes abundant early enough to injure you
bolls, make one or two more applications late in the season.
10. If you have a heavy rain within 24 hours after dusting, repeat t
application immediately (or that part of it done within the
hours).
11. Do not expect to eradicate the weevils. Poisoning merely contr
them enough to get a full crop, and you can always find weevils
the successfully poisoned field.
12. Keep cotton acreage low and try to increase the yield per acre, as
costs as much to poison one-quarter bale per acre cotton as b
per acre cotton.

If you wish to prove the matter to yourself, leave an occasional fair average part unpoisoned to compare its yield with the adjoining poisoned part.

If you intend to poison, get in touch with County Agent, or State officials, or U. S. Delta Laboratory at Tallulah, La., for any special help they may offer.

"DO IT RIGHT OR NOT AT ALL"

Analysis of Poison.—The calcium arsenate to be used for cotton sting should analyze as follows: not less than 40 per cent total arsenic ntoxid—not more than 0.75 per cent water-soluble arsenic pentoxid—nsity not less than 80 or more than 100 cubic inches per pound.

In former years the United States Department Agriculture made alyses of samples, but this is now impracticable and largely unneces-y, as the manufacturers have the material fairly well standardized.

TESTS BY VIRGINIA-CAROLINA CHEMICAL COMPANY

Agricultural Service Bureau, A. E. Grantham, Director

During 1922 this organization supervised tests of the dust-poison thod on many farms in North Carolina, South Carolina, Georgia, d Alabama, and in a booklet ("Beating the Boll Weevil," issued cember, 1922) the results are given for 237 farms where the *com-rative* yields of dusted and (adjoining) undusted cotton were secured. e plan included in each case 5 acres dusted and 5 acres not dusted. so large a series, over so wide territory (and with such large plots), egularities in land and infestation were sure to occur—and their tes indicate this. In some of their fields (in North Carolina also) the estation was light so the gains were small. It is probable also that ne of the work was better done, or better timed, than in other cases. nce wide differences in the details of the results are not surprising. eir general plan was much the same as we advise in the preceding ges.

When we average their results as secured in each state we find the llowing:

DUST-POISON METHOD, BOLL-WEEVIL CONTROL

VIRGINIA-CAROLINA CHEMICAL COMPANY TESTS, 1922

STATE	Number Tests	Number Localities	Average Gain, Pounds of Seed Cotton per Acre, by Dusting
bama	16	4	151
rgia	125	22	333
rth Carolina	16	4	185
th Carolina	80	13	269

The general average from all 237 tests, figured on basis of one ac was as follows:

Dusted cotton, lbs. seed cotton per acre	857 lbs.
Not dusted, lbs. seed cotton per acre	562 lbs.
Gain—lbs. seed cotton per acre, by dusting	295 lbs.

They figure the average cost of dusting at $7.20 per acre, and on th basis the 295 lbs. seed cotton gives a substantial net profit above co

FINAL REMARKS

Mr. B. R. Coad, of United States Bureau of Entomology, stationed at Delta Laboratory, Tallulah, La., who has been chiefly instrumental in developing the dust-poison method, has said: "The gains vary widely but usually average 200 to 400 lbs. seed cotton per acre." An exc average of the two figures he mentions would be 300 lbs. It is interest ing to note that in our own seven North Carolina tests (in 1922) the average gain was 319 lbs. seed cotton per acre (or 305 lbs. per acre on the six short-staple tests only), and that in the 237 tests by the Virgini Carolina Chemical Company (in 1922) the average gain was 295 lbs seed cotton per acre.

It therefore seems fair to regard 300 lbs. seed cotton per acre as good standard gain to *hope for* from proper dusting when weevils are rather abundant. But it is perhaps best to *expect* less than we hope for and a gain of 200 lbs. seed cotton per acre is gratifying. For, whe fluctuations in prices vary the case, it is generally true that a gain of 100 lbs. seed cotton per acre will pay the cost of a season's dusting— on 1922 prices about 75 lbs. would have done it—we can run into endless calculations on costs and possible prices and possible profits or loss but it is not our place to do this. Our results of 1922 indicate a sound pro from proper employment of the dust-poison method for control of the weevil.